

The Impact and Recovery of Ice Roads and Ice Pads on Tundra Ecosystems, National Petroleum Reserve, Alaska (NPR-A)

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Since the mid 1970's, oil companies have been using ice roads and ice pads to support exploratory drilling in Alaska's National Petroleum Reserve (NPR-A). The ice roads are used to haul exploratory equipment and supplies to the drill site during winter months and the equipment is taken off the site before spring thaw. Ice roads are constructed by harvesting available ice and snow to form a road base, and then use water from local lakes to build up the ice surface. The construction and use of ice roads by the petroleum industry has provided access into environmentally sensitive areas without the permanent impact from gravel road construction.

The case study was a 37.5 mile long ice road, built in 1978 from the Kikiakrorak River to the Inigok drill site. Color infrared (CIR) photography taken in 1979 and 2002 was used to identify and locate ice road traces. Field analysis was conducted during the summer of 2001-2003 on the disturbance caused by the construction of ice roads and ice pads in NPR-A.

National Technical Means remote sensing data was used in identifying the location of current 2001 and 2002 ice roads for comparison. Field examination compared the impact of a one-year 2001 ice roads and a one-year 2002 ice road to the one-year 1978 Kik-Inigok ice road constructed 24 years earlier. Data was gathered from each transect on the profiles of the surface terrain, depth to permafrost, vegetation and vegetation damage. The impacts to vegetation on the '02 and '01 ice roads and Puviaq ice pad showed damage to the shrubs, forbs and tussocks. More significant damage occurred on the drier upland sites with little or no evidence of damage to the moist wetland sites. Comparison transects across the '78 Kik-Inigok ice road showed a full recovery and restoration of damage to shrubs, forbs and tussocks, which were vigorous and in good condition.

In March of 2003 a tour of Puviaq exploratory drill site was conducted. The ice air field, ice road, maintenance of the ice road and the ice pad at Puviaq were all observed and photographed. The site was revisited in July of 2003 to assess impacts from the use of ice road and pad technology. Ice construction during the winter of 2001 had limited impacts to the tundra environment, similar to those found on the more historical ice roads.

The ice road data supports the conclusion that a single year ice road and pad can completely be restored and returned to its natural state over time. Ice roads and pads that support drilling operations, if built with care, can have no long term effects to the fragile tundra environment.